International Journal of Mathematics and Computer Applications Research (IJMCAR)
ISSN (P): 2249-6955; ISSN (E): 2249-8060
Vol. 8, Issue 6, Dec 2018, 1-12

METHODOLOGY FOR DETERMINING THE GRADUATES' PROFILE FOR A MASTERY IN MATHEMATICS

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ABSTRACT

With the purpose of strengthening a master's program, it is necessary to pay special attention to the quality of its graduates, and for it to egress profile. When considering an educational program as a process, the area of statistical quality control has the ability to be applied to generate improved responses. One of these quality techniques is the Function Deployment Quality (QFD) that is supported by statistical tools such as surveys, TOPSIS, Thurstone, etc. This guided work shows the result; a methodology for the identification of desirable features that should be included in the profile of graduates of a master's degree in mathematics, in particular, of the Master of Science (Mathematics) of the Faculty of Physical and Mathematical Sciences of the Autonomous University of Puebla, which is our subject of study.

KEYWORDS: Quality Function Deployment, Outcome Profile, Educational Quality & Voice of the Customer

Received: Oct 13, 2018; **Accepted**: Nov 03, 2018; **Published**: Nov 26, 2018; **Paper Id**.: IJMCARDEC20181

Original Article

1. INTRODUCTION

In the professional area of mathematics, it is always evolving, associated with the immense challenge of adapting to changes and creating responses to new problems and continuing to work on old ones. For this reason, it is important for educational institutions to establish guidelines in their programs related to the educational service offered in terms of the process of their development and provision, as well as those who are involved in the implementation and measurement of results, among them, the graduation profile that describes the desirable characteristics that students should have when they finish their studies. In addition, it is in this aspect, where the objectives of the program can be measured. Therefore, a egress profile defines what should be achieved in the teaching-learning process.

The Faculty of Physical Mathematical Sciences (FCFM) of the Benemérita Autonomous University of Puebla (BUAP) worried about forming high level competitive citizens, has among its programs the Master of Science (Mathematics) (MCM), governed by the current university model Minerva in the BUAP, where defines agraduate profile as "the one where the characteristics of a graduate are specified according to the set of "knowledge"to express (in addition to knowledge, skills, attitudes and values according to the proposal of integral and pertinent training) the so-called four pillars of education:learning to know, learning to do, learning to be and learning to live together, also adds learning to undertake, learning to unlearn, as well as the commitment to social integration" (BUAP, 2009). The educational quality can be understood as: *the characteristics that the educational system must provide to students to prepare them for life, with the ability to continue on their own with constant learning, in summary, useful characteristics for your life and your development in society*. Also, agraduate profile is one of the indicators of program quality. Because the main objective is to obtain quality graduates that allow

them in the professional scope to be leaders in their field, or be able to acquire advanced mathematical knowledge.

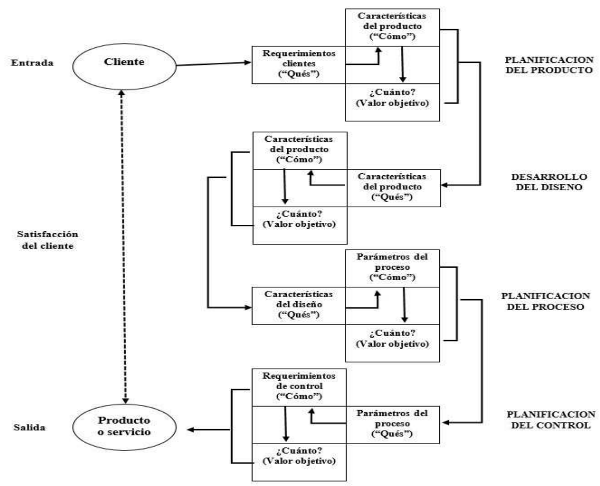
The Quality Function Deployment (QFD) is a quality methodology that is oriented to the educational environment, allowing the planning of products and educational processes through the identification of the needs and expectations of the clients (students, teachers, businesses, etc.), prioritizing these expectations and needs according to their level of importance and finally, focusing all resources of the institution towards meeting these expectations. In summary, QFD guides the planning of the design, based on the needs of the clients and the selection of the most suitable alternatives. Its goal is to create greater customer satisfaction, with the philosophy "the voice of the client", composed of four phases (the house of quality, the deployment in parts, the approach of the process and the approach of the production) represented by a matrix of "input data" (WHAT) and "output data" (HOW) (Yacuzzi y Martín, 2003; Franceschini, 2001).

In order to strengthen the aforementioned master's program, that currently has the international recognition provided byConsejo Nacional de Ciencia y Tecnología (CONACYT), it is of great interest to maintain the level reached. And, leadership is achieved by the leaders, as Masters in actuality, as to the quality of their graduation. For these reasons, the aim is to strengthen considering a proposal for improvement of the graduate profile based on QFD.

2. THEORETICAL FOUNDATION

2.1 Quality Function Deployment

QFDis a product and service design methodology that collects the client's voice and translates it, through a sequence of systematized and ordered steps, in design and operation characteristics; the same ones that satisfy the demands and expectations of the market. Its evolution has turned QFD into a methodology capable of systematizing the information obtained from the client up to define the characteristics of the product or service, adapting it to the needs and expectations detected (Franceschini, 2002). It consists of a structure of successive matrices called "Houses" by the way they have, that allow to transmit "what the clients want" called "WHAT" in "How to satisfy these needs" called "HOW". Regarding the way to apply QFD, a generic model called the Matrix of Matrices was developed, that was adapted to generate the model called model of the four phases *(Phase I: Planning Matrix or Quality House. Phase II: Matrix for deployment in parts or design. Phase III: Process planning matrix. Phase IV: Control planning matrix)* which became the basis of the approach of American Supplier Institute (ASI) and is the one that is usually followed (See Figure 1).



Source: Balderrama I. M. (2008).

Figure 1: Matrix Relationship Graph

2.2 Mathematical Methods within QFD

2.2.1 Law of the Comparative Judgment of Thurstone

One of the suggested tools to carry out the process of prioritization of the requirements of the clients is based on the so-called "Law of Comparative Judgment" (LJC) by Thurstone (Franceschini, 2014) that applied to QFD can be useful for the purposes pursued. This method consists in taking the judgments of the clients from a requested scale of 5 points to a strategy, which they consider more realistic, in which, only a binary comparison is made between requirements to decide which is more important and make an order ranking, without a measure of subjective proportion difficult to decipher, to later locate the importance of the clients in a continuous scale, proposed by the method. The idea can be taken to QFD, referring to stimuli such as R (Requirements or needs of customers), and the scale of estimated values will be its priorities, that is, each R will possess a level of importance or preference determined on a continuous scale in $(-\infty, \infty)$. If judges are surveyed about the level of preference of each of the R, it is assumed that, for each i-th R, the preference is normally distributed, i.e., $R_i \sim N\left(\mu_i, \sigma^2\right)$, with$\mu_i$and $\sigma^2$the unknown mean and variance, where ofcourse$R_i$represents the preference of the i requirement. This assumption is made, since it is considered as large sample sizeand because, when the assessments are made, the subjects have close judgments for being decision makers with homogeneous characteristics. In the method, *the mean* is chosenas the representative of the synthesis of the preference judgmentsand the goal is to estimate it. In the standard Thurstone scaling, the peer-to-peer comparison approach is used to collect response data, because of the psychological issue of human thinking and stimuli, as already commented. A practical alternative to this procedure is the one proposed by Franceschini and Maisano (2014), where instead of sampling the preference of each requirement in front of all, they established that respondents scoring each R in order of importance on a scale of five levels, and thus, generate a ranking of the requirements. This avoids the complex and tedious of the original procedure.

The general steps of the Thurstone procedure together with the contribution of Franceschini and Maisano are the following:

- Respondents assign to the R_sa score of importance on a scale of 5 points, 1-nothing important to 5-very important. This scale is proposed because, it is simple and intuitive for the respondent, although being so limited it can lead to obtain R_s with identical levels of importance. This problem can be solved using a wider scale.
- For each respondent, a ranking of requirements is generated based on the data from point 1, where only the following cases can be given, for$R_i$andR_j:
  - $R_i \sim R_j$: $R_i$is indifferent or just as important than R_j.
  - $R_i > R_j$: $R_i$is preferable or more important than R_j.
  - $R_i < R_j$: $R_j$is preferable or more important thanR_i.
- Each of the rankings in step 2 is transformed into comparison data between pairs reported in the form of a "binary" matrix, the rows and columns represent each of the R_s whose entries are defined by:
  - 0.5 if $R_i \sim R_j$, i.e., when the R of the i-th row and the R of the j-th column have an identical level of importance.
  - 1 if $R_i > R_j$, i.e., when the R of the i-th row is preferred over the R represented by the jth column.

- 0 if $R_i < R_j$, i.e., when the R of the i-esima row is less preferred than the R represented by the j-th column.

With this, as many matrices are generated as the number of respondents, say N.

- A single frequency matrix is generated$F$ whose elementsf_{ij}represent the number of times than$R_i$was preferred toR_j.
- A matrix P is constructed from F, whose elements are the $p_{ij} = P\left(R_{ij} \geq 0\right) = f_{ij}/N$.
- A Z matrix is now calculated using the matrix P by applying the functionϕ^{-1}, where each entry$z_{ij}$of the matrix Z is $z_{ij} = \phi^{-1}(1 - p_{ij})$, and where$\phi^{-1}$is the standard normal distribution.
- Now, we get the importance value of the R_s, with the values of the Thurstone scale that are obtained from the elements of the Z matrix by calculating the $\overline{z_j} = \sum_{i=1}^{n} z_{ij}/n$.
- The R_s with negative values on the scale are judged to be less favorable than the mean of the scale values of all R_s and those with positive scale values are judged to be more favorable than the mean. This will not change the relative position of the scale values in the psychological continuum. Useful aspect for QFD is, it is usual to use a scale from 1 to 5.

This procedure can be seen graphically in Figure 2, where it is shown how the R_s keep their proximity to each other after scaling in a given example.

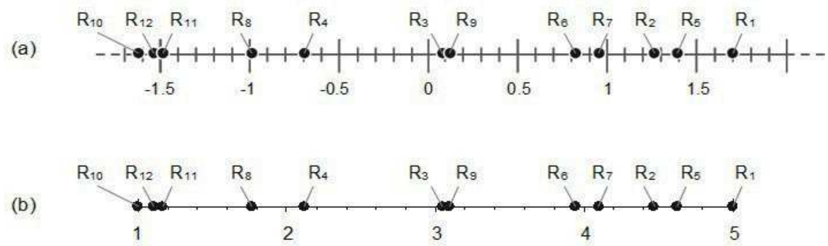


Figure 2: Result of the Thurstone scale before (a) and after (b) of the scale transformation.

2.2.2 TOPSIS Method

TOPSIS method (García, 2009) (Technique for Order Preference by Similarity to Ideal Solution), by Hwang and Yoon seeks to choose the best alternative based on the distance to the ideal, and to the anti-ideal, thus the following basic definitions are given:We start from having the alternatives $A_i, i = 1, 2, \ldots, m$and a decision matrix, with $x_{ij} = U_j(A_i), j = 1, 2, \ldots, n$. Where U is the utility function of the decider. We can, without loss of generality, transform the utilities, so that all the criteria are maximized / minimized and that all the$x_{ij} > 0$.

Definition: It is called, ideal point in ($\mathbb{R}^n$)to the point $A^M = (A_1^M, A_2^M, \ldots, A_n^M)$, where $A_i^M = máx_i x_{ij}$, for the case of benefit criteria and $A_i^M = mín_i x_{ij}$ for the case of cost criteria. The alternative$A^M$is called *ideal alternative*.

Definition: It is called anti-ideal point in ($\mathbb{R}^n$) to the point $A^m = (A_1^m, A_2^m, \ldots, A_n^m)$ where $A_i^m = mín_i x_{ij}$, for the case of benefit criteriaand $A_i^m = máx_i x_{ij}$ for the case of cost criteria. The alternative A^m is called *anti-ideal alternative*.

The algorithm of the TOPSIS method is as follows:

2.2.2.1 Step 1: Establishment of the Decision Matrix

The TOPSIS method evaluates the following decision matrix that refers to m alternatives $A_i, i = 1, 2, \ldots, m$ which are evaluated according to n criteria $C_j, j = 1, \ldots, n$. See Table1.

Table 1: Decision Matrix

Alternativas	Atributos			
	(w_1)	(w_2)	$\cdots$	(w_m)
	C_1	C_2	$\cdots$	C_m
A_1	m_{11}	m_{12}	$\cdots$	m_{1m}
A_2	m_{21}	m_{22}	$\cdots$	m_{2m}
$\vdots$	$\cdots$	$\cdots$	$\ddots$	$\vdots$
A_n	m_{n1}	m_{n2}	$\cdots$	m_{nm}

Where x_{ij} denotes the evaluation of the i-th alternative in terms of the j-th criterion. And, where $W = [w_1, w_2, \ldots, w_n]$ is the vector of weights associated with C_j.

2.2.2.2 Step 2: Normalization of the Decision Matrix

The TOPSIS method first converts the dimensions of the different criteria into non-dimensional criteria. An element $\bar{n}_{ij}$ of the normalized decision matrix $N = [\bar{n}_{ij}]_{m\times n}$ is calculated as follows: $\bar{n}_{ij} = \frac{x_{ij}}{x_{ij}^{max}}, j = 1, \ldots, m$.

This rule represents the percentage of the maximum and is considered the most appropriate.

2.2.2.3 Step 3: Build the Weighted Standard Decision Matrix

The normalized weighted value $\bar{v}_{ij}$ of the weighted normalized decision matrix $V = [\bar{v}_{ij}]_{m\times n}$ it is calculated as:

$$\bar{v}_{ij} = w_j \times \bar{n}_{ij}, j = 1, \ldots, m.$$

Where, w_j such that $1 = \sum_{j=1}^{n} w_j$ is the weight of the j-th attribute or criterion. Estos pesos pueden obtenerse de diferentes modos: mediante asignación directa, mediante Thurstone, etc.

2.2.2.4 Step 4: Determine the Ideal Positive Solution (IPS) and the Ideal Negative Solution (INS)

Originally, the set of positive ideal values $\bar{A}^+$ and the set of negative ideal values $\bar{A}^-$ are determined as:

$$\bar{A}^+ = \{\bar{v}_1{}^+, \ldots, \bar{v}_1{}^+\} = \{(máx_i \bar{v}_{ij}, j \in J')(mín_i \bar{v}_{ij}, j \in J')\}, i = 1,2, \ldots m$$

$$\bar{A}^{-\,-} = \{\bar{v}_1{}^-, \ldots, \bar{v}_1{}^-\} = \{(mín_i \bar{v}_{ij}, j \in J')(máx_i \bar{v}_{ij}, j \in J')\}, i = 1,2, \ldots m$$

Where, J is associated with the benefit criterias and J' is associated with the cost criterias. However, due to an investment problem of the alternatives to increase or decrease the number of these, It was studied by García (2009)that, if you redefine $\bar{A}^+$ and $\bar{A}^-$ as the best and worst alternative possible in absolute terms, together with the norm chosen in the previous step, this investment problem is solved. Therefore, we chose this modification.

2.2.2.5 Step 5: Calculation of Distance Measures of the Ideal Positive Solution $\bar{\mathbf{A}}^{+}$

$$\bar{d}_i^{\,+} = \left\{\sum_{j=1}^{n}\left(\bar{v}_{ij} - \bar{v}_{ij}^{\,+}\right)^2\right\}^{\frac{1}{2}}, i = 1, \dots, m;\ \bar{d}_i^{\,-} = \left\{\sum_{j=1}^{n}\left(\bar{v}_{ij} - \bar{v}_{ij}^{\,-}\right)^2\right\}^{\frac{1}{2}}, i = 1, \dots, m$$

2.2.2.6 Step 6: Calculation of the Relative Proximity to the Ideal Solution $\bar{\mathbf{R}}_{\mathbf{i}}$

$\bar{R}_i = \frac{\bar{d}_i^{\,-}}{\bar{d}_i^{\,+} - \bar{d}_i^{\,-}}, i = 1, \dots, m$. If $\bar{R}_i$=1, then$A_i = \bar{A}^{+}$. If $\bar{R}_i$=0, then $A_i = \bar{A}^{-}$

2.2.2.7 Step 7: Sorting Preferences

The best alternatives are ordered according to $\bar{R}_i$ in descending order.

2.3 ELECTRE II

ELECTRE (The elimination and the choice that reflects the reality) is an over classification method based on comparisons between pairs of alternatives. Its objective is to order the potential actions, from best to worst, tolerating those that remain the same. This is done from matching and non-discordance tests, distinguishing two types of over classifications or preferences, strong and weak (De Vicente, 1998).

3. METHODOLOGY

The methodological proposal considers a hybrid system of the QFD methodology, in terms of the initial orientation towards the design of a product (graduate) based on service processes (educational service offered) to determine the graduate profile of the Master of Science (Mathematics) of the FCFM of the BUAP. Through the development of the house of quality, which is the first phase and basis for the development of the following. It consists of 7 stages (see Annex 1).

3.1 Customer Requirements

"Customers" (students and teachers) are identifiedand the requirements are obtained from them, which represent the wishes and needs of clients organized in a hierarchical structure that will be prioritized in terms of relative importance and satisfaction with current alternatives. They are constituted by two requirements: Knowledge and skills, which are deployed to a second level of detail (See Table 2).

Table 2: Customer Requirements

First Level	Second Level
Knowledge	R_1 = Detailed knowledge in the field of specialization. R_2 = Detailed knowledge in the basic areas. R_3 = Knowledge to join a scientific research project or a technological project that requires a mathematician. R_4 = Pedagogical knowledge. R_5 = Knowledge about the different activities performed by a mathematician. R_6 = Knowledge about Research Methodology. R_7 = Knowledge of specialized Software.
Skills	R_8 = Critical skill. R_9 = Capacity in the forms of expression of a professional of mathematics. R_{10} = Skill to develop a research article. R_{11} = Express yourself correctly in Spanish orally and in writing. R_{12} = Express yourself correctly in English orally and in writing. R_{13} = Deduction skill. R_{14} = Imaginative ability.

	R_{15} = Raising research problems in mathematics. R_{16} = Pose application problems. R_{17} = General and specialized writing. R_{18} = Review of specialized material. R_{19} = Solve and raise applied problems from various areas other than mathematics.

3.2 Quality Planning

The Thurstone method is used separately for working "knowledge" and "skills". A "Benchmarking" is performedto identify the current perception of customers about the program under study and its strongest competitors in relation to each WHAT, indicating the level of satisfaction (s_{ij}). The *target value* is also defined (o_i). *Improvement ratio* ($m_i = o_i/s_{ij}$); the absolute weight to obtain the absolute importance of each requirement ($I_i = w_i \cdot m_i \cdot v_i$); and the relative weight (percentage of importance) that each requirement represents (IR_i). They are calculated and registered. At the end, the order of importance of each WHAT is obtained by assigning a correlative order to the weights obtained, and they are represented by a histogram, so visually with the results we choose decisions.

3.3 Determination of the HOWS

At this stage, customer requirements are transformed into detailed design specifications and technical specifications (measurable characteristics of the product), also called HOWS, which are the elements of the master's program that are involved in the fulfillment of each characteristic of the profile, as well as its measurement parameters (See Annex 1, part 3).

3.4 Relationship WHAT-HOW

The objective here is to identify the affect relationships of each HOW, for the compliance of each WHE by assigning values with the symbology (shown in Table 3 part a).

3.5 Correlations

When the objective is to improve an indicator, the direction of improvement must be specified, so that the direction in which the indicator must be varied is established in order to satisfy the WHAT it is related to, as shown in Table 3 part b). The HOWs defined for compliance with the requirements are in many cases related to each other, and this relationship is considered to analyze the impact that each requirement has on the operation of the others as shown in Table 3 part c), allowing possible negative correlations, and indicate if the relation is univocal or biunivocal to indicate the meaning.

Table 3: Symbology

(a) Relationship Notation			(b) Correlation Symbols			(c) Improvement Indicators	
Relationship	**Symbol**	**Value**	**Relationship**	**Symbol**	**Value**	**Improvement trend**	**Symbol**
Strong Half Weak Null	• ◦ Δ -	9 3 1 0	Positive weak Positive strong Null Weak negative Strong negative	++ + - --	3 1 -1 -3	Increase indicator Decrease indicator Adjust to the nominal value	↑ ↓ -

3.6 Design Planning

This part contains two types of information: The absolute importance of each of the technical characteristics and the comparative information based on the technical performance of the competition. A weighting of the relative importance

of each characteristic (HOW) must be assigned according to the influence it has on all the needs of the clients, based on the relationship matrix and the relative weight of the client's requirements. For this, TOPSIS gives a ranking of the alternatives that, in this case are the HOWS, according to the comparison to the ideal and anti-ideal alternative possible in the problema. The clients' requirements together with the vector of weights of normalized importance and the matrix of relations form the decision matrix to work in TOPSIS. Once obtained the absolute weights, the relative weight of each HOW is calculated, which will indicate the percentage of importance that represents each technical requirement (QR_i). Repeating the same with the "WHAT", the order of importance of each HOW is noted, and the technical "benchmarking" graph that visually represents the data of the two previous steps is constructed.

3.7 How Many

The technical importance (the "how many") provides a vision of the global importance of each of the technical characteristics, that is, the elements of the program on the set of the demands of the clients.

3.8 Quality Profile Design

The last step to be executed is the design of the quality profile, establishing the values of the characteristics of the master's program that surpass the competition with the minimum effort. For this, the assessment of said characteristics in the masters chosen as the competition is compared, with the values of a profile that is designed to meet these objectives. With the algorithm called Qbench, the first profile is generated with the marginal values of the characteristics, because it is the minimum acceptable value, and it is used as a method of preferences to ELECTRE II.

4. RESULTS

4.1 Desirable Graduate Profile

Having identified the requirements, developed are the indicators of Quality, the matrices of relations, correlations, the table of planning of the quality, as well asthe rest of the elements, in each step. The Planning Quality House is being prepared, which is the concentration and closure of the different stages that make up this analysis and methodological proposal of QFD in the determination of the Desirable Graduate Profile of the Master. Initially, the characteristics of the graduation profile that are of greater relevance covering 80%, and those that should constitute the desirable graduation profile are obtained. This is deduced from the elements of the quality planning table, in which, the important assessment given by the professors, whom we consider the experts and representatives of the institution is analyzed, as well as comparison is made with the similar masters, from here and from the current graduation profile, and the desirable graduation profile is formulated.

The graduate of Master of Mathematics of the FCFM BUAP, upon finishing his studies, will have a solid formation at an advanced level in the field of mathematics, particularly in his area of specialty. This will allow him to continue with doctoral studies, if he wishes, which should be ideal to follow, and will be able to incorporate efficiently in the professional field, preferably in research groups or institutions of an interdisciplinary or multidisciplinary nature. In case of leaning towards teaching, it has the necessary capacity for transmission of knowledge and its integration in curricular revisions related to the area of mathematics, at a higher level. The general areas in which he must operate will be research, teaching, application and the continuation of doctoral studies.

Upon graduation, he will do so with the following skills and knowledge (Table 4):

Table 4: Skills and Knowledge

Knowledge	Mathematical Skills	Complementary Skills	Skills in Theoretical and Applied Research
Knowledge in basic and specialization mathematics.	Appropriately use the basic knowledge and specialty of mathematics.	Drafting in general and specialized.	Understand and interpret specialized material.
Knowledge of the forms of communication characteristic of a professional of mathematics.	Deduction.	Critical capacity.	
Knowledge on Methodology of scientific research	Imagination.	Skill to communicate fluently whether orally or in writing in Spanish and English.	

Regarding the attitude and values necessary for their good performance as a professional, the students are always encouraged to have a positive attitude, individual and group work with empathy, respect and commitment.

4.2 Improvement Plan

Below, the elements of the program are presented, to which, they must pay more attention to produce an improvement that impacts on the fulfillment of the profile and consequently on the results of the graduates. The elements that represent 75% of the total, as can be seen in Annex 1 part 6 of the quality house are strong quality indicators that allow strengthening the compliance of the profile and keep it current, these are:

- Contents of the algebra, analysis I and II and specialty courses.
- Exposition in seminars. Development of the thesis work.
- Greater participation in national and international events, as well as making publications.
- Linkage and exchange with other laboratories or research centers, both public and private.

Therefore, it is proposed:

- Attention to the elements of the basic courses, such as algebra, analysis I and II and those of specialty in terms of their content, updates, bibliography, teachers and the orientation of the basic courses according to the research line chosen to reinforce the specialization, the most competitive element and considered most important, according to the study.
- Analyze the follow-up of the development of the thesis work, from the choice of topics, to the development of the forums for progress, reforming them, so that they achieve the objectives for which they were created, and provide the students with the necessary support and guidance for a good thesis work. We emphasize here that the development of the thesis work along with the specialization courses, are the first elements to which we must pay attention.
- It is proposed that the research seminars by academic board, be the basis in the improvement of the thesis works.

- Currently, publishing is not mandatory at this level, but doing so would greatly benefit the professional's own characteristics such as: critical capacity, appropriate communication, review and writing of specialized material, use of specialized knowledge and in some cases, the possibility of address applied problems.
- The link is a weak element, it was also identified by the director and the research secretary, it was with a high degree of importance in the study, so it is proposed to encourage this activity in the students, at least once, to strengthen the knowledge in their area, in addition to acquiring the necessary skills to join a research project, reaffirm their forms of expression, develop skills such as deductive capacity, criticism, and raise problems. The program must maintain mobility agreements looking for at least one per academic board.

5. CONCLUSIONS

The complete process of developing QFD is a structured procedure of chaining the different phases, of which, we scrupulously presented the development of the first, which allowed us to achieve the proposed objectives that make up the start of the improvement planning, which, if adopted by the relevant authorities can be carried out throughout the process by implementing the results in the master's program. Companies apply QFD in their products or services, and usually only design the first phase and achieve great results in their improvement strategies. The results obtained as requirements of the clients were wide, however, it would need a consensus by all the teachers' level of the master's degree to show the totality of opinions which can be very different. In this work, we highlight the characteristics shown by the majority, when compared to the current profile and in comparison with similar ones. A review of the profile is made without the intention of creating one from scratch because, if we wanted to create a new one, we would need more information about the pedagogical part. It was intended to analyze and review the current profile from the perspective of the clients “professors” considering the expertise in the subject and as representatives of the institution. In carrying out the field work, there were presentthe greatest difficulties. It was initially intended to conduct the study by taking as clients also the graduates, students and companies, but difficult access to companies and graduates coupled with apathy by the students, it was only decided to work from the point of view of the teachers, who were considered to be the most appropriate for the study. It is because, they know the role of these actors and at the same time, the operation of the program. Note that, a methodology has been developed, which would allow reviewing the graduate profile of a Master of Science (Mathematics). This methodology combines QFD with mathematical tools such as AHP, Thurstone, ELECTRE, Qbench, affinity diagrams, survey design and TOPSIS, oriented to an educational institution. The QFD process with the aspects described here can be taken for application to another educational program at the graduate level, adapting and choosing the appropriate tools according to their characteristics.

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